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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/800,342	03/12/2004	Andrew J. Calver	GE1-027US	9887

21718 7590 02/20/2007
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EXAMINER	
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ART UNIT	**PAPER NUMBER**
2609	

SHORTENED STATUTORY PERIOD OF RESPONSE	NOTIFICATION DATE	DELIVERY MODE
3 MONTHS	02/20/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Notice of this Office communication was sent electronically on the above-indicated "Notification Date" and has a shortened statutory period for reply of 3 MONTHS from 02/20/2007.

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Office Action Summary	Application No.	Applicant(s)	
	10/800,342	CALVER ET AL.	
	Examiner	Art Unit	
	David P. Rashid	2112	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-43_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-43_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _12 March 2004_ is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _3/12/2004, 1/30/2007_.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

All of the examiner's suggestions presented herein below have been assumed for examination purposes, unless otherwise noted.

Drawings

1. The drawings are objected to because of the following informalities:

(i) The following is a quote from 37 CFR 1.84(u)(1):

> View numbers must be preceded by the abbreviation "FIG."

The view numbers from all figures contain lowercase letters and all must be capitalized – ex: suggest changing "Fig. 1" to "FIG. 1"

(ii) The following is a quote from 37 CFR 1.84(l):

> Every line, number, and letter must be durable, clean , black (except for color drawings), sufficiently dense and dark, and uniformly thick and well-defined.

(a) Fig. 4 view number is not solid black – suggest changing to solid black as in the other figures.

(b) Fig. 4, reference numerals 100, 102, and 400 arrows are not solid black – suggest changing to solid black as in the other figures.

(iii) The following is a quote from 37 CFR 1.84(q):

> Lead lines are those lines between the reference characters and the details referred to. Such lines may be straight or curved and should be as short as possible. They must originate in the immediate proximity of the reference character and extend to the feature indicated.

Fig. 5 "X-Axis" and "Y-Axis" lead lines to not completely extend to their respective coordinate axis – suggest extended to their respective coordinate axis.

2. The following is a quote from 37 CFR 1.84(l):

> Every line, number, and letter must be durable, clean , black (except for color drawings), sufficiently dense and dark, and uniformly thick and well-defined.

3. FIG. 1 is rejected under 37 CFR 1.84(l) for failing to make all lines black as some lines outlining the truck disclosed in the figure are solid white.

4. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

5. The disclosure is objected to because of the following informalities:

(i) Page 5, line 16 contains a reference to the incorrect reference numeral – suggest changing "space 100." to "space 102.".

(ii) Page 9, line 17 contains a reference to the incorrect element altogether – suggest changing "within the image configuration library 312 are less than" to "within the edge image library 314 are less than".

(iii) Page 10, lines 19 – 22 makes reference to reference numerals that do not correlate to those being depicted in Fig. 5. The specification state "lines labeled 403 and 404 are not separated by a uniform distance. In particular, the difference between distance 502 and distance 510 indicates the presence of cargo 506." The difference between distance 502 and distance 510 in Fig. 5 is in reference to lines 402 and 403, not 403 and 404 as the specification states – suggest changing line 20: "labeled 403 and 404" to "labeled 402 and 403".

(iv) Page 11, line 18 contains a reference to the incorrect reference numeral – suggest changing "which are separated by a distance 403C." to "which are separated by a distance 403D."

Appropriate correction is required.

Claim Objections

6. 37 CFR 1.75(a) reads as follows:

> The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.

7. Claim 6, line 2 is unclear when stating "...camera's perspective to view of slope of at least one..." and may contain a grammatical error. The specification cites "The separation allows the camera to see changes in the slope (i.e. direction) of the lines...". The examiner suggests changing "...camera's perspective to view of slope of at least one..." to "camera's perspective to view changes in the slope of at least one...".

Appropriate correction is required.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims **1, 3, 4, 7, 8, 9, 11, 12, 13, 14, 15, 29, 31, 32, 33, 34** and **35** are rejected under 35 U.S.C. 102(b) as being anticipated by Rao et al. (US 5666441 A).

Regarding **claim** 1, Rao et al. discloses a system ("The invention includes a system to detect 3-D rectangular objects.", column 2, line 60), comprising:

a camera to obtain an image of a cargo space ("The invention also includes a method to detect rectangular solids in real images in arbitrary orientations, positions, distance from the camera and lighting.", column 2, line 61. FIG. 2 and FIG.3 show typical images taken from the camera showing cargo. It has been assumed for examination purposes that any specific area intended to store and/or move the cargo (whether a box, package, etc) over a period of time constitutes "cargo space", as shown in these images.); and

an image evaluator to recognize lines within the image ("The preferred embodiment was implemented in C on a SUN SparcStation 2 running Unix. The entire processing, from image acquisition to the result of box detection takes about 20 seconds per image frame. The code could easily run at a frame a second; or even real time (several frames a second) on image processing hardware (such as the Datacube MaxVideo 20 image processing system).", line 9, line 59), and to evaluate the lines for indications of cargo (FIG. 4 shows one of the low level processes as finding lines contained in the image to further proceed in processing for determination whether the cargo is present or not. This constitutes "evaluation of the lines for indications of cargo".).

Regarding **claim 3**, Rao et al. discloses the system of claim 1, wherein the lines include straight lines or curves ("This software takes the edge image as input and converts the edge data to straight lines and circular arcs.", column 6, line 37).

Regarding **claim 4**, Rao et al. discloses the system of claim 1, wherein the indications are selected from a group consisting of:

slope of at least one of the recognized lines ("Let .alpha., .beta. and .gamma. be the three angles of the fork junction as shown in FIG. 26. If the fork junction is an orthographic projection of a vertex of a rectangular 3-D object, no angle can be greater than 270.degree..", column 7, line 38. This is in regard the the high level grouping junction analysis as shown in FIG. 4.);

change in brightness along at least one of the recognized lines (An edge is a position in a digital image where the luminous intensity (brightness is the perception elicited by luminance) changes sharply - thus a change in brightness will most certainly be a change in luminosity within the digital image, and hence a matter of whether an edge detector will calculate it with a threshold. "This method works by detecting junctions and adjacent edges of rectangular solids.", column 2, line 63 in combination with "The resultant value is zero for a particular pixel, if the difference between the gray values for the reference frame and image being processed is less than some threshold, T", column 5, line 38. The edges detected are later processed into lines as follows: "This software takes the edge image as input and converts the edge data to straight lines and circular arcs.", column 6, line 37. Hence it can be concluded that all recognized lines where generated from the ORT software that used edges that were calculated from changes in brightness.); and

discontinuity in at least one of the recognized lines ("In the above conditions, one may replace a fork junction with a Tlambda junction, since Tlambda junctions, are a special case of fork junctions. Of the conditions discussed above, the matching fork junction and triplet is the strongest condition, since for this condition to be satisfied the fork and triplet have to belong to a rectangular object. Another strong condition is when two matching forks are found.", column 9, line 31. The Tlambda junction is shown in FIG. 11a, showing a discontinuity where all three lines meet.).

Regarding **claim 7**, Rao et al. discloses the system of claim 1, additionally comprising: an edge detection module to detect edges of surfaces defining the cargo space, wherein the edges comprise the lines within the image (As referenced in claim 4: "This method works by detecting junctions and adjacent edges of rectangular solids.", column 2, line 63 in combination with "The resultant value is zero for a particular pixel, if the difference between the gray values for the reference frame and image being processed is less than some threshold, T", column 5, line 38. The edges detected are later processed into lines as follows: "This software takes the edge image as input and converts the edge data to straight lines and circular arcs.", column 6, line 37. The edge detection is also shown as a low level process in FIG. 4.).

Regarding **claim 8**, Rao et al. discloses the system of claim 1, additionally comprising: a projection pattern image library comprising a projection pattern image; and wherein the image evaluator is configured to compare the image to the projection pattern image (Column 7, line 46 through column 8, line 51 shows how detected lines are further high-level processed by

comparing the detected lines to three orthographic projections. A projection pattern image library could be all possible representations of TABLE 1 (column 8, line 34) and hence comprising a specific projection pattern image (lets say, all tri-orthogonal vectors such that 2 angles are acute and one obtuse, in specific: angle 1 = 35 degrees, angle 2 = 25 degrees, angle 3 = 120 degrees), from which the calculated orthographic projection pattern from equations 2 – 4 (column 7, line 60) are used to calculate angles that are compared to TABLE 1.).

Regarding **claim 9**, Rao et al. discloses a processor-readable medium comprising processor-executable instructions for ("The invention could easily be adapted to any computer software and computer hardware that can implement the invention.", column 9, line 67.):

sensing lines within an image of a cargo space (FIG. 4 shows one of the low level processes as finding lines contained in the digital image to further proceed in processing for determination whether the cargo is present or not. This constitutes "sensing lines within an image of a cargo". It has been assumed for examination purposes that any specific area intended to store and/or move the cargo (whether a box, package, etc) over a period of time constitutes "cargo space".);

evaluating the lines (Once the lines have been found, FIG. 4 shows a high level evaluation of the lines to form junctions.); and

basing an indication of presence of cargo on the evaluation ("In sum, the detection of a rectangular solid is based on either matching forks, triplets or a matching fork and triplet.", column 4, line 62.).

Regarding **claim 11**, Rao et al. discloses a processor-readable medium as recited in claim 9, wherein the lines are formed by instructions for intersection of planes defining the cargo space (High level grouping to detect 3D rectangular objects discloses using the three unit vectors in the image plan as shown in FIG. 26 to calculate fork junctions and triplets as disclosed from column 7, line 46 through column 8, line 51).

Regarding **claim 12**, Rao et al. discloses a processor-readable medium as recited in claim 9, wherein the evaluating comprises instructions for: measuring distances between lines within a projection pattern; and determining if the measured distances indicate the presence of cargo ("In many cases, however, only one face of the box is visible to the camera. In this case, no fork junction will be formed. Therefore, as a second condition, two matching triplets are sought. Two triplets are said to match, if they share two out of three limbs. If the shared limbs are the two outer limbs in both the triplets, then the center limbs of both the triplets must be at least at a distance of the maximum of the length of the two limbs.", column 9, line 11. The calculation can be carried out for the triplets in question since they are categorized as a projection pattern under TABLE 1.)

Regarding **claim 13**, Rao et al. discloses a processor-readable medium as recited in claim 9, wherein the evaluating comprises instructions for measuring slope of lines within a projection pattern (Refer to claim 8 under the presumption that angle calculation is the same as slope calculation with linear functions.).

Regarding **claim 14**, Rao et al. discloses a processor-readable medium as recited in claim 9, wherein the evaluating comprises instructions for reviewing lines within a projection pattern for breaks in continuity ("In the above conditions, one may replace a fork junction with a Tlambda junction, since Tlambda junctions, are a special case of fork junctions. Of the conditions discussed above, the matching fork junction and triplet is the strongest condition, since for this condition to be satisfied the fork and triplet have to belong to a rectangular object. Another strong condition is when two matching forks are found.", column 9, line 31. The Tlambda junction is shown in FIG. 11a, showing a discontinuity where all three lines meet. The projection pattern reference is given in claim 13.).

Regarding **claim 15**, Rao et al. discloses a processor-readable medium as recited in claim 9, wherein the evaluating comprises instructions for measuring uniformity of brightness of lines within a projection pattern (Refer to reference given for claim 14. Tlambda and T junctions in Fig. 11a and Fig. 11b are lines with a lack of uniformity of brightness (one part of the line being black, the discontinuity in the junction being non-black – thus a change and measure of uniformity of brightness). The projection pattern reference is given in claim 13.).

Regarding **claim 29**, Rao et al. discloses a method of determining cargo presence ("The invention includes a system to detect 3-D rectangular objects.", column 2, line 60), comprising:

defining a projection pattern within a cargo space (Refer to claim 8.);

capturing an image of the projection pattern with a camera ("The invention also includes a method to detect rectangular solids in real images in arbitrary orientations, positions, distance

from the camera and lighting.", column 2, line 61. FIG. 2 and FIG.3 show typical images taken from the camera showing cargo.);

evaluating lines within the projection pattern for evidence of cargo (Calculation of fork junctions and triplets as disclosed from column 7, line 46 through column 8, line 51.); and

basing an indication of cargo presence on the evaluation (Equations 12 and 13, column 10 calculates the probability of detection.).

Regarding **claim 31**, Rao et al. discloses the method of claim 29, wherein the projection pattern is defined by intersection of planes defining the cargo space (High level grouping to detect 3D rectangular objects discloses using the three unit vectors in the image plan as shown in FIG. 26 to calculate fork junctions and triplets as disclosed from column 7, line 46 through column 8, line 51. In specific, "Let V_1, V_2 and V_3 be the unit vectors in the image plane as shown in FIG. 26", column 7, line 46.).

Regarding **claim 32**, Rao et al. discloses the method of claim 29, wherein the evaluating comprises evaluating lines in the projection pattern for discontinuities ("In the above conditions, one may replace a fork junction with a Tlambda junction, since Tlambda junctions, are a special case of fork junctions. Of the conditions discussed above, the matching fork junction and triplet is the strongest condition, since for this condition to be satisfied the fork and triplet have to belong to a rectangular object. Another strong condition is when two matching forks are found.", column 9, line 31. The Tlambda junction is shown in FIG. 11a, showing a discontinuity where all three lines meet.).

Regarding **claim 33**, Rao et al. discloses the method of claim 29, wherein the evaluating comprises evaluating lines in the projection pattern for changes in brightness (Refer to reference given for claim 14. Tlambda and T junctions in Fig. 11a and Fig. 11b are lines with a lack of uniformity of brightness (one part of the line being black, the discontinuity in the junction being non-black – thus a change and measure of uniformity of brightness).).

Regarding **claim 34**, Rao et al. discloses the method of claim 29, wherein the evaluating comprises evaluating lines in the projection pattern for changes in slope (Refer to claim 8 under the presumption that angle calculation is the same as slope calculation with linear functions.).

Regarding **claim 35**, Rao et al. discloses the method of claim 29, wherein the evaluating comprises: measuring distance between the lines within the projection pattern; and determining if the measured distance is within a threshold of an appropriate value ("In many cases, however, only one face of the box is visible to the camera. In this case, no fork junction will be formed. Therefore, as a second condition, two matching triplets are sought. Two triplets are said to match, if they share two out of three limbs. If the shared limbs are the two outer limbs in both the triplets, then the center limbs of both the triplets must be at least at a distance of the maximum of the length of the two limbs.", column 9, line 11.).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. **Claim 2** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination between Rao et al. (US 5,666,441 A) and Hannon et al. (US 4,688,244 A).

While Rao et al. discloses the system of claim 1, Rao et al. does not teach the camera comprising an infrared (IR) imaging device.

Hannon et al. teaches an integrated cargo security system (title of the patent) with a imaging device comprising an infrared camera ("A high light sensitivity camera is preferred, and under some conditions, an infrared sensitive camera may be employed...", column 7, line 65.)

It would have been obvious at the time the invention was made to one ordinary skilled in the art to use a camera comprising an infrared imaging device as taught by Hannon et al. "...for very low light conditions.", column 7, line 67.

11. **Claims 5, 6, 10, 16, 17, 19, 20 , 21, 22, 23, 24, 25, 26, 27, 28, 30, 36, 37, 38, 39, 40, 41, 42** and **43** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination between Rao et al. (US 6,366,689 B1) (of which will be referred to as Rao'689) and Rao et al. (US 5,666,441 A) (of which will be referred to as Rao'441).

Regarding **claim 5**, Rao'689 discloses the system ("...a system for inspecting a component is provided.", column 1, line 53) of claim 1 comprising:

a camera to obtain an image ("The system includes an imaging system, such as a digital camera.", column 1, line 54.); and

an image evaluator to recognize lines within the image ("Imaging system 108 is a digital imaging system that is operable to generate a digital image of component 102 as illuminated by grid 104.", column 3, line 29.), and

to evaluate the lines for indications ("The composite map is then used to analyze the component or device for defects or damage.", column 5, line 41.), additionally comprising:

a projection pattern generator to trace a laser over a projection pattern, wherein the projection pattern comprises the lines within the image ("Grid 104 may be generated by a suitable lighting system, such as a laser lighting system, a light source that is directed through a template, or other suitable lighting systems.", column 2, line 60.). However, Rao'689 does not detect cargo within cargo space.

Rao'441 detects cargo within cargo space through the evaluation of lines (refer to claim 1) and a projection pattern as discussed above (refer to claim 8).

It would have been obvious to one ordinary skilled in the art to detect cargo within cargo space through the evaluation of lines as taught by Rao'441 to "...overcome any or all of the above-cited problems in detecting rectangular solids....", Rao'441, column 2, line 52.

Regarding **claim 6**, Rao'689 discloses the system of claim 5, wherein the laser and the camera are separately located to enhance the camera's perspective to view changes in the slope

of at least one of the recognized lines (Rao'689 states in the embodiment of FIG. 2 that the two separate imaging systems to pick up defects that one may see and the other may not see: "Controller 202 is operable to receive the imaging data from imaging system 108 and the imaging data from imaging system 204, and to analyze the two images to determine whether any features of component 102 are absent from one or the other of the image data generated by imaging system 108 and imaging system 204. In this manner, controller 202 may determine whether features that have been obscured to one or the other of imaging system 108 and imaging system 204 should be analyzed for damage, or other purposes.", column , line . It is inherent that the two cameras are separately located to achieve this result. FIG. 2 shows one grid system to project the laser grid pattern in relation to the two imaging systems. Even if the grid system was not separately located to one of the imaging systems, it would have to be to the other, and hence the grid system is separately located to at least one of the imaging systems (wherein the imaging system comprises a camera).)

Regarding **claim 10**, Rao'689 discloses a processor-readable medium ("Controller 110 may be implemented in hardware, software...", column 3, line 62) of claim 9, comprising processor-executable instructions for:

sensing lines within an image of a cargo space ("Imaging system 108 is a digital imaging system that is operable to generate a digital image of component 102 as illuminated by grid 104.", column 3, line 29.);

evaluating the lines ("The composite map is then used to analyze the component or device for defects or damage.", column 5, line 41.); and

basing an indication of presence on the evaluation ("The composite map is then used to analyze the component or device for defects or damage.", column 5, line 41.), wherein the lines are formed by instruction for tracing a laser over a pattern within the space (FIG. 7A and FIG. 7B show the lines formed by instruction for tracing a laser over a pattern within the space.). However, Rao'689 does not detect the presence of cargo within cargo space.

Rao'441 detects the presence of cargo within cargo space through the evaluation of lines (refer to claim 1) and a projection pattern as discussed above (refer to claim 8).

It would have been obvious to one ordinary skilled in the art to detect the presence of within cargo within cargo space through the evaluation of lines as taught by Rao'441 to "...overcome any or all of the above-cited problems in detecting rectangular solids....", Rao'441, column 2, line 52.

Regarding **claim 16**, Rao'689 discloses a processor-readable medium ("Controller 110 may be implemented in hardware, software...", column 3, line 62) comprising processor-executable instructions for:

forming a pattern within a space using a laser ("Imaging system 108 is a digital imaging system that is operable to generate a digital image of component 102 as illuminated by grid 104.", column 3, line 29.);

obtaining an image of the pattern ("The system includes an imaging system, such as a digital camera.", column 1, line 54.);

analyzing the image (FIG. 5 shows the image being analyzed.); and

basing an indication of presence on the analysis("The composite map is then used to analyze the component or device for defects or damage.", column 5, line 41.). However, Rao'689 does not detect the presence of cargo within cargo space.

Rao'441 detects the presence of cargo within cargo space through the evaluation of lines (refer to claim 1) and a projection pattern as discussed above (refer to claim 8).

It would have been obvious to one ordinary skilled in the art to detect the presence of within cargo within cargo space through the evaluation of lines as taught by Rao'441 to "...overcome any or all of the above-cited problems in detecting rectangular solids....", Rao'441, column 2, line 52.

Regarding **claim 17**, Rao'689 discloses a processor-readable medium as recited in claim 16, wherein the forming comprises instructions for comparing the image to images within a projection pattern image library ("For example, the features having known dimensions such as leads will generate an expected grid pattern if no damage has been caused to these features. If the features are damaged, the illumination by the grid will generate lines that are not existent, broken, or otherwise indicative of damage.", column 10, line 19. An expected grid pattern containing features having known dimensions constitutes the comparison to a "projection pattern image library".).

Regarding **claim 19**, Rao'689 a processor-readable medium as recited in claim 16, wherein the analyzing comprises instructions for: measuring distances between lines within the pattern; and determining if the measured distances indicate presence (FIG. 7B in combination

with "The plane of device 716 in diagram 750 is parallel to the normal viewing plane 714, and the grid lines in diagram 750 are evenly spaced along leads of device 716, having a spacing 710. The plane of device 716 in diagram 760 is at an angle to the normal viewing plane 714, and the grid lines 712 in diagram 760 have a spacing that is different from the spacing 710 of grid lines along an axis of the device 716 that is not angularly disposed from the normal plane. Thus, it is possible to determine the angle of the plane of device 716 from the normal plane 714 in diagram 760 based upon the difference between spacing 710 and spacing 712.", column 11, line 42.). However, Rao'689 does not determine if the measured distance indicates cargo presence.

Rao'441 detects the presence of cargo within cargo space through the evaluation of lines (refer to claim 1) and a projection pattern as discussed above (refer to claim 8).

It would have been obvious at the time the invention was made to one ordinary skilled in the art to detect the presence of within cargo within cargo space through the evaluation of lines as taught by Rao'441 to "...overcome any or all of the above-cited problems in detecting rectangular solids....", Rao'441, column 2, line 52.

Regarding **claim 20**, Rao'689 discloses a processor-readable medium as recited in claim 16, wherein the analyzing comprises instructions for recognizing a slope change, in a line within the pattern, indicating presence ("If the features are damaged, the illumination by the grid will generate lines that are not existent, broken, or otherwise indicative of damage. Such features are excluded from the angular displacement analysis. The method then proceeds to 528 where the difference between the expected and actual image data is used to determine the angle from a normal plane of the plane in which the device or component lies. This angle is determined for

each data point with respect to the angle at which the data point was taken when composite image data from two or more imaging systems is used.", column 10, line 22.). However, Rao'689 does not indicate cargo presence.

Rao'441 detects the presence of cargo within cargo space through the evaluation of lines (refer to claim 1) and a projection pattern as discussed above (refer to reference in claim 8).

It would have been obvious at the time the invention was made to one ordinary skilled in the art to detect the presence of within cargo within cargo space through the evaluation of lines as taught by Rao'441 to "...overcome any or all of the above-cited problems in detecting rectangular solids....", Rao'441, column 2, line 52.

Regarding **claim 21**, Rao'689 discloses a processor-readable medium as recited in claim 16, wherein the analyzing comprises instructions for recognizing brightness change, in a line within the pattern, indicating presence ("If the lead is bent, however, then the grid 104 illumination of that lead may be shorter, longer, or broken, as compared with the expected illumination pattern. Inspection system 310 is operable to compare the illumination of the features of component 102 with expected and allowable variations, and to generate an alarm or other operator signal that indicates that component 102 may be damaged or unacceptable.", column 7, line 23. It is inherent that in the case of when the lead is bent, one or more lines from within the illumination pattern may be shorter or broken, and thus there exists a change in brightness of a line within the pattern. A change from presence of a line to no presence of a line constitutes a change in brightness.). However, Rao'689 does not indicate cargo presence.

Rao'441 detects the presence of cargo within cargo space through the evaluation of lines (refer to claim 1) and a projection pattern as discussed above (refer to claim 8).

It would have been obvious at the time the invention was made to one ordinary skilled in the art to detect the presence of within cargo within cargo space through the evaluation of lines as taught by Rao'441 to "...overcome any or all of the above-cited problems in detecting rectangular solids....", Rao'441, column 2, line 52.

Regarding **claim 22**, Rao'689 discloses a processor-readable medium as recited in claim 16, wherein the analyzing comprises instructions for recognizing discontinuities, in a line within the pattern, indicating presence (refer to reference in claim 21). However, Rao'689 does not indicate cargo presence.

Rao'441 detects the presence of cargo within cargo space through the evaluation of lines (refer to claim 1) and a projection pattern as discussed above (refer to claim 8).

It would have been obvious at the time the invention was made to one ordinary skilled in the art to detect the presence of within cargo within cargo space through the evaluation of lines as taught by Rao'441 to "...overcome any or all of the above-cited problems in detecting rectangular solids....", Rao'441, column 2, line 52.

Regarding **claim 23**, Rao'689 discloses a sensing device ("...a system for inspecting a component is provided.", column 1, line 53), comprising:

means for defining a projection pattern within a space ("Imaging system 108 is a digital imaging system that is operable to generate a digital image of component 102 as illuminated by grid 104.", column 3, line 29.);

means for obtaining an image of the projection pattern ("The system includes an imaging system, such as a digital camera.", column 1, line 54.);

means for measuring distortion of the projection pattern within the image ("If the lead is bent, however, then the grid 104 illumination of that lead may be shorter, longer, or broken, as compared with the expected illumination pattern. Inspection system 310 is operable to compare the illumination of the features of component 102 with expected and allowable variations, and to generate an alarm or other operator signal that indicates that component 102 may be damaged or unacceptable.", column 7, line 23.); and

means for comparing the distortion to a threshold value (Refer to reference above in regards to comparing to expected grid pattern, as shown in further detail in FIG. 5). However, Rao'689 does not disclose a cargo sensing device within a cargo space.

Rao'441 detects the presence of cargo within cargo space through the evaluation of lines (refer to claim 1) and a projection pattern as discussed above (refer to claim 8).

It would have been obvious at the time the invention was made to one ordinary skilled in the art to detect the presence of within cargo within cargo space through the evaluation of lines as taught by Rao'441 to "...overcome any or all of the above-cited problems in detecting rectangular solids....", Rao'441, column 2, line 52.

The means-plus-function elements of claim 23 is anticipated by the computer hardware/software/memory interaction as disclosed by Rao'689 ("Controller 110 may be

implemented in hardware, software, or a suitable combination of hardware and software, and may be one or more software systems operating on a general purpose computing platform.", column 3, line 62.) and Rao'441 ("The invention could easily be adapted to any computer software and computer hardware that can implement the invention.", column 9, line 67.) as well as the application under examination (FIG. 2 elements).

Regarding **claim 24**, Rao'689 discloses the sensing device of claim 23, wherein the means for comparing is a means selected from a group consisting of:

means for recognizing slope of at least one of the recognized lines indicating presence (refer to reference cited in claim 20);

means for recognizing change in brightness along at least one of the recognized lines indicating presence (refer to reference cited in claim 21); and

means for recognizing discontinuity in at least one of the recognized lines indicating presence (refer to reference cited in claim 21).

The means-plus-function elements of claim 23 is anticipated by the computer hardware/software/memory interaction as disclosed by Rao'689 ("Controller 110 may be implemented in hardware, software, or a suitable combination of hardware and software, and may be one or more software systems operating on a general purpose computing platform.", column 3, line 62.) and Rao'441 ("The invention could easily be adapted to any computer software and computer hardware that can implement the invention.", column 9, line 67.) as well as the application under examination (FIG. 2 elements).

Regarding **claim 25**, Rao'689 discloses the sensing device of claim 23, wherein the projection pattern is defined by lines resulting from intersection of planes defining the space (It is inherent that lead 718 in FIG.7A is three-dimensional and thus defined by the intersection of three-planes. FIG. 7A depicts the laser pattern grid overlaying unto lead 718 and thus, being defined by lines resulting from the intersection of planes defining the space.). However, Rao'689 does not disclose a cargo sensing device within a cargo space.

Rao'441 detects the presence of cargo within cargo space through the evaluation of lines (refer to claim 1) and a projection pattern as discussed above (refer to claim 8).

It would have been obvious at the time the invention was made to one ordinary skilled in the art to detect the presence of within cargo within cargo space through the evaluation of lines as taught by Rao'441 to "...overcome any or all of the above-cited problems in detecting rectangular solids....", Rao'441, column 2, line 52.

Regarding **claim 26**, claim 19 recites identical features as in claim 26. Thus, arguments and references cited equivalent to that presented above for claim 19 is equally applicable to claim 26. Regarding **claim 27**, claim 21 recites identical features as in claim 27. Thus, arguments and references cited equivalent to that presented above for claim 21 is equally applicable to claim 27. Regarding **claim 28**, claim 17 recites identical features as in claim 28. Thus, arguments and references cited equivalent to that presented above for claim 17 is equally applicable to claim 28.

Regarding **claim 30**, Rao'689 discloses the method ("...a system for inspecting a component is provided.", column 1, line 53) of determining presence, comprising:

defining a projection pattern within a space (refer to claim 23);

capturing an image of the projection pattern with a camera (refer to claim 23);

evaluating lines within the projection pattern for evidence of presence (refer to claim 23); and

basing an indication of presence on the evaluation (refer to claim 23), wherein the projection pattern is defined by tracing over a pattern repeatedly with a laser ("For example, the grid pattern may be made by tracing a pattern with the laser beam, by physically moving the laser apparatus, or by creating a pattern in a liquid crystal mask or template system.", column 8, line 60. The physically moving of the laser grid constitutes tracing over a pattern repeatedly.). However, Rao'689 does not disclose a cargo sensing device within a cargo space.

Rao'441 detects the presence of cargo within cargo space through the evaluation of lines (refer to claim 1) and a projection pattern as discussed above (refer to claim 8).

It would have been obvious at the time the invention was made to one ordinary skilled in the art to detect the presence of within cargo within cargo space through the evaluation of lines as taught by Rao'441 to "...overcome any or all of the above-cited problems in detecting rectangular solids....", Rao'441, column 2, line 52.

Regarding **claim 36**, Rao'689 discloses a method ("...a system for inspecting a component is provided.", column 1, line 53), comprising:

projecting an optical pattern within a space (refer to reference cited in claim 16); and

analyzing the optical pattern to determine whether a defect is present within the space (refer to reference cited in claim 16). However, Rao'689 does not disclose a cargo sensing device within a cargo space.

Rao'441 detects the presence of cargo within cargo space through the evaluation of lines (refer to claim 1) and a projection pattern as discussed above (refer to claim 8).

It would have been obvious at the time the invention was made to one ordinary skilled in the art to detect the presence of within cargo within cargo space through the evaluation of lines as taught by Rao'441 to "...overcome any or all of the above-cited problems in detecting rectangular solids....", Rao'441, column 2, line 52.

Regarding **claim 37**, claim 16 recites identical features as in claim 37. Thus, arguments and references cited equivalent to that presented above for claim 16 are equally applicable to claim 37. Regarding **claim 38**, claim 21 recites identical features as in claim 38. Thus, arguments and references cited equivalent to that presented above for claim 21 are equally applicable to claim 38. Regarding **claim 39**, claim 20 recites identical features as in claim 39. Thus, arguments and references cited equivalent to that presented above for claim 20 are equally applicable to claim 39. Regarding **claim 40**, claim 19 recites identical features as in claim 40. Thus, arguments and references cited equivalent to that presented above for claim 19 are equally applicable to claim 40. Regarding **claim 41**, claims 16 and 17 recite identical features as in claim 41. Thus, arguments and references cited equivalent to that presented above for claims 16 and 17 are equally applicable to claim 41. Regarding **claim 42**, claims 17 recite identical

features as in claim 42. Thus, arguments and references cited equivalent to that presented above for claims 17 are equally applicable to claim 42.

Regarding **claim 43**, while Rao'689 discloses the method of claim 36 wherein the analyzing step comprises comparing the optical pattern to a projection pattern image library comprising images of defective-free and microchip containing areas, Rao'689 does not disclose the analyzing step comprising comparing the optical pattern to a projection pattern image library comprising images of empty cargo areas and cargo-containing cargo areas.

Rao'441 detects the presence of cargo within cargo space through the evaluation of lines (refer to claim 1) and a projection pattern as discussed above (refer to claim 8). In particular, Rao'441 compares images of empty cargo areas and cargo-containing cargo areas ("To illustrate the above system, reconsider FIG. 2, an image being analyzed for the presence of a box. FIG. 12 and 13 show the edge maps of images of FIGS. 2 and 6 respectively (FIG. 2 is the image being analyzed and FIG. 6 is the reference image).", column 9, line 41 in combination with comparing the two images of FIG. 2 and FIG. 6.).

It would have been obvious at the time the invention was made to one ordinary skilled in the art to compare images of empty cargo areas and cargo-containing cargo areas as taught by Rao'441 to "...get rid of the stationary parts of the image...", Rao'441, column 5, line 27.

12. **Claim 18** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination between Rao et al. (US 6,366,689 B1) (of which will be referred to as Rao'689) and Rao et al.

(US 5,666,441 A) (of which will be referred to as Rao'441) in further view of Hannon et al. (US 4,688,244 A).

While the combination between Rao'689 and Rao'441 disclose a processor-readable medium as recited in claim 16, the combination does not teach the obtaining step comprising instructions for operating a camera to capture the image.

Hannon et al. teaches an integrated cargo security system (title of the patent) with a security module "which employs a programmed microprocessor" (column 2, line 69) that has an obtaining step comprising instructions for operating a camera to capture the image ("...the security module may operate the video camera recorder...", column 4, line 11).

It would have been obvious at the time the invention was made to one ordinary skilled in the art to have an obtaining step comprising instructions for operating a camera to capture the image "When an unauthorized even occurs during the trip...", column 4, line 10.

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David P. Rashid whose telephone number is (571) 270-1578. The examiner can normally be reached on 7:30 - 17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Werner can be reached on (571) 272-7401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DPR
David P Rashid
Examiner
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BRIAN WERNER
SUPERVISORY PATENT EXAMINER